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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,006	08/26/2003	Sai-Mun Lee	70011377-2	5926
57299	7590	03/31/2006	EXAMINER	
AVAGO TECHNOLOGIES, LTD. P.O. BOX 1920 DENVER, CO 80201-1920			NADAV, ORI	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 03/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/649,006

Applicant(s)

LEE ET AL.

Examiner

Ori Nadav

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-7,9 and 11-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-7,9 and 11-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 9/6/05
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

In view of the appeal brief filed on 01/20/2006, PROSECUTION IS HEREBY REOPENED. A rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

### ***Specification***

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### ***Information Disclosure Statement***

The information disclosure statement filed on 07/02/2004 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered by the examiner.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-2, 5-7, 9 and 11-18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification recites a first hollow extending from the first side of the substrate to a die and a second hollow (recess) extending from the die to the second side of the substrate. There is no support in the specification for a hollow extending from the first side of the substrate to the second side of the substrate, as recited in claim 1, because claim 1 already recites a recess [second recess] in the second side of the substrate.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 5-7, 9 and 11-12, are rejected under 35 U.S.C. 102(b) as being anticipated by Hamzehdoost et al. (5,491,362).

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Hamzehdoost et al. teach in figure 5 and related text a packaging structure for a semiconductor device, comprising:

- a substrate surface-mountable on a mounting surface of a circuit board, wherein the substrate 204 has a first side facing away from the mounting surface and a second side being on the same side of the structure as the mounting surface, and wherein the substrate is hollow, with the hollow extending from the first side of the substrate to the second side of the substrate;

- a recess in the second side of the substrate;

- a semiconductor die 202 having a first side and a second side, and mounted in said recess, with the first side of the semiconductor die facing away from the mounting surface and a portion of the first side of the semiconductor die bonded to said substrate within the recess by electrically conductive bonding pads 214.

Regarding claim 2, Hamzehdoost et al. teach in figure 5 and related text a recess includes an exposed portion of the substrate facing the mounting surface and said portion of the first side of the semiconductor die is bonded to said exposed portion.

Regarding claims 5-7, Hamzehdoost et al. teach in figure 5 and related text said substrate comprises first and second substrate layers, the first substrate layer having first and second opposing sides and the second substrate layer having first and second opposing sides; the first side of the first substrate layer is the first side of the substrate and the second side of the second substrate layer is the second side of the substrate',

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and the second side of the first substrate layer is mounted to the first side of the second substrate layer,

a second substrate layer has inner walls defining a hollow portion extending from the first side of the second substrate layer to the second side of the second substrate layer, with the inner walls defining at least pad of said recess and said hollow, and

wherein the first substrate layer has a hollow portion, coincident with the hollow portion of the second substrate layer, extending from the first side of the first substrate layer to the second side of the first substrate layer; the hollow portion through the first substrate layer is smaller than the hollow portion through the second substrate layer, such that where the second side of the first substrate layer is mounted to the first side of the second substrate layer, a portion of the second side of the first substrate layer is exposed, not being covered by the first side of the second substrate layer; and the exposed portion of the first substrate layer defines at least pad of the recess.

Regarding claim 9, Hamzehdoost et al. teach in figure 5 and related text electrical connections running from where the die is bonded to said recess to the mounting surface.

Regarding claims 11-12, Hamzehdoost et al. teach in figure 5 and related text a semiconductor die has edges and further comprising sealant 214 between the edges of said semiconductor die and said substrate, wherein said sealant comprises a highly viscous material.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamzehdoost et al. in view of Peterson et al. (6,674,159).

Regarding claims 13-15 Hamzehdoost et al. teaches substantially the entire claimed structure, as applied to claim 1 above, except a thermally conductive and electrically insulating encapsulant in said recess on the second side of the semiconductor die, wherein the encapsulant comprises a viscous material and is flush with the level of the second side of the substrate.

Peterson et al. teach in figure 18 and related text a thermally conductive and electrically insulating encapsulant in said recess on the second side of the semiconductor die, wherein the encapsulant comprises a viscous material and is flush with the level of the second side of the substrate. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a thermally conductive and electrically insulating encapsulant in said recess on the second side of the semiconductor die, wherein the encapsulant comprises a viscous material and is flush with the level of the second side of the substrate, in Hamzehdoost et al.'s device in order to provide better protection for wirings of the device.

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Regarding claims 16-18, Hamzehdoost et al. teaches substantially the entire claimed structure, as applied to claim 1 above, except a sensor die and a non-opaque portion mounted to the substrate on the same side of the structure as the first side of the substrate, wherein said non-opaque portion is a transparent cover on the first side of the substrate.

Peterson et al. teach in figure 3A and related text a sensor die (column 5, lines 4-6) and a non-opaque portion mounted to the substrate on the same side of the structure as the first side of the substrate, wherein said non-opaque portion is a transparent cover 26 on the first side of the substrate. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a sensor die and a non-opaque portion mounted to the substrate on the same side of the structure as the first side of the substrate, wherein said non-opaque portion is a transparent cover on the first side of the substrate in Hamzehdoost et al.'s device in order to use the device in an application which requires a sensor die and in order to obtain a transparent cover for the package for mounting optical components/sensors; respectively.

### ***Response to Arguments***

Applicant argues that there is support in the specification for a hollow extending from the first side of the substrate to the second side of the substrate, as recited in claim 1, because the specification recites "The hollow within the substrate is made up of a first



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recess 42, in the first major side 44 and a second recess 48 in the second major side 46 (the underside in the orientation of Figure 2), meeting within the substrate”.

The examiner agrees that the specification recites a hollow within the substrate is made up of a first recess and a second recess. However, there is no support in the specification for a hollow [first recess and second recess] extending from the first side of the substrate to the second side of the substrate, as recited in claim 1, because claim 1 already recites a recess [second recess] in the second side of the substrate.

The rest of applicant's arguments with respect to claims 1-2, 5-7, 9 and 11-18 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference B is cited as being related to devices having a hollow extending from the first side of the substrate to the second side of the substrate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ori Nadav whose telephone number is 571-272-1660. The examiner can normally be reached between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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